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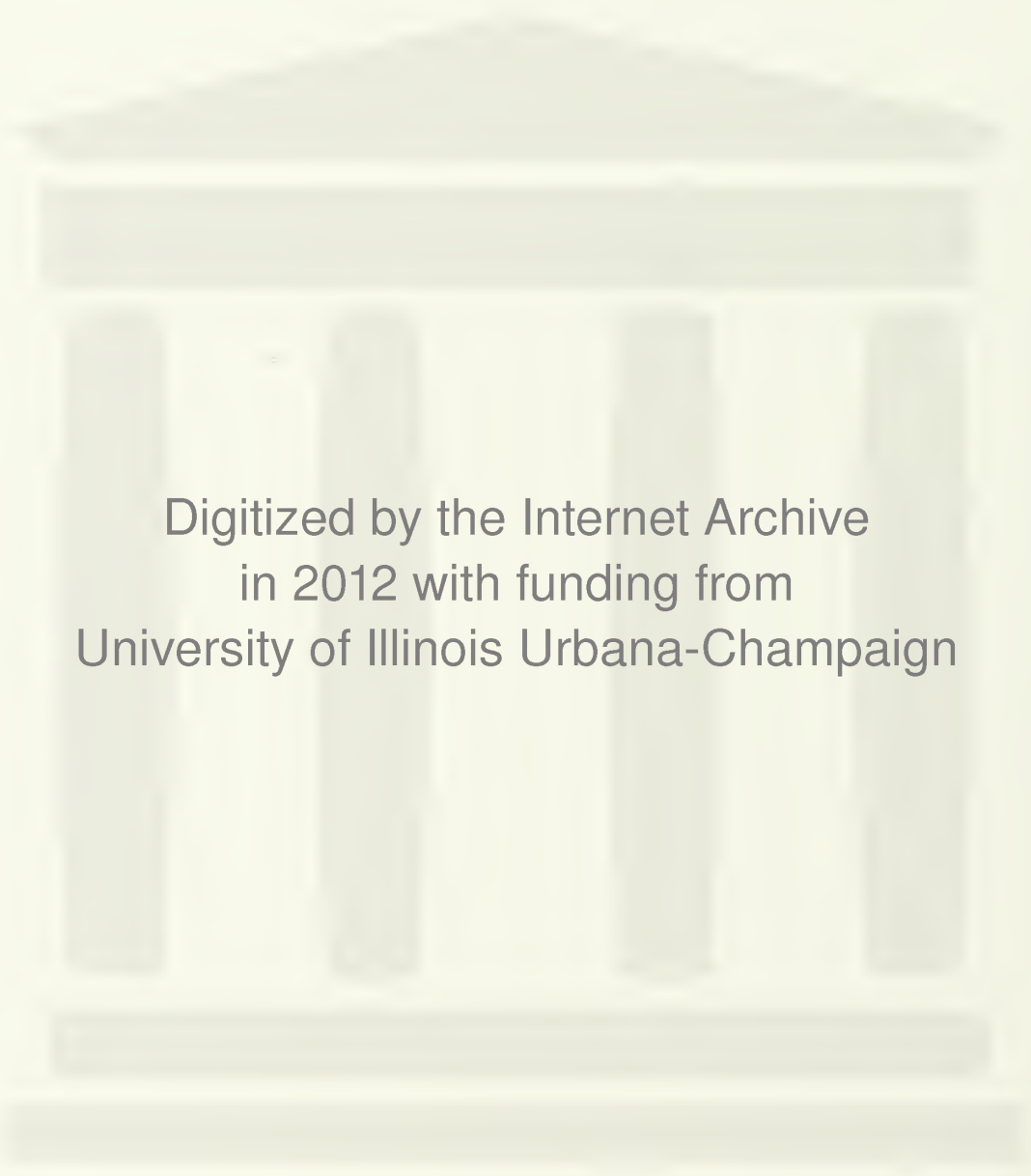
REPORT OF THE OFFICE OF

Coal Development and Marketing

1988

Illinois Department of
Energy and Natural Resources



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REPORT OF THE OFFICE OF
Coal Development and Marketing

James R. Thompson
Governor

Karen A. Witter
Director

July 1989

(Printed by Authority of the State of Illinois)
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The Office of Coal Development and Marketing

The State of Illinois continues its efforts to increase use of the large reserves of Illinois coal through the bold programs coordinated by the Illinois Department of Energy and Natural Resources, the lead agency in this effort.

The ENR Office of Coal Development and Marketing addresses the varied problems that plague Illinois coal production by maintaining a strong commitment to innovative technology development. Research and commercial technologies produced through the coal development programs have already achieved national attention. The ENR-sponsored projects offer the promise of improved, economically feasible methods to clean and burn coal without threat to the environment, resulting in a strengthened future for Illinois coal.

The high sulfur content of the state's bituminous coal resources is the recognized factor preventing the Illinois coal industry from achieving its full potential. Much of the $13 million in state funds devoted to laboratory research since 1981 has been directed toward solving the sulfur problem of Illinois coal. Advances in exploratory and applied research are critical to increased usage.

In addition to the efforts being conducted in public and private laboratories throughout Illinois, the state's coal office sponsors large-scale demonstration projects through the Clean Coal Technology Demonstration Program. The goal of this $113 million program is to bring promising technologies to full commercialization.

The state's coal office also encourages commercial coal development through the Illinois Industrial Coal Utilization Program, which offers low-interest loans for converting industrial facilities from oil and natural gas to coal; the Illinois Coordinated Review Process, which assists in issuing permits for major energy development projects; and the Illinois Coal Marketing Program, which promotes clean coal technologies and use of Illinois coal in domestic and international markets.

The Illinois Coal Development Board

Since its creation by Governor James R. Thompson and the General Assembly in 1981, the Illinois Coal Development Board has played a pivotal role in advancing the promise of Illinois coal. Empowered by the same legislative mandates that govern the Illinois Department of Energy and Natural Resources, the board annually establishes research priorities and coordinates and funds coal research programs that comply with the chosen agenda. The board's authority includes review and funding approval over all research, demonstration and industrial utilization projects supported by the ENR coal office. As advisors on coal development programs, board members connect producers with research and funding sources.

By state statute, the Illinois Coal Development Board is composed of 10 representatives of state government and coal-related industries. The collective experience of these board members provides for expert administration of Illinois' coal research efforts. The state government members are the director of the Illinois Department of Energy and Natural Resources, who serves as chairman; the director of the Illinois Department of Mines and Minerals; the co-chairs of the General Assembly's Citizens Council on Energy Resources; and the director of the Illinois Department of Commerce and Community Affairs. Appointed by the Governor and confirmed by the Illinois Senate, the public members of the board represent industries involved in extraction, use or transportation of Illinois coal and financial institutions active in industrial development.

Illinois Coal Development Board Members

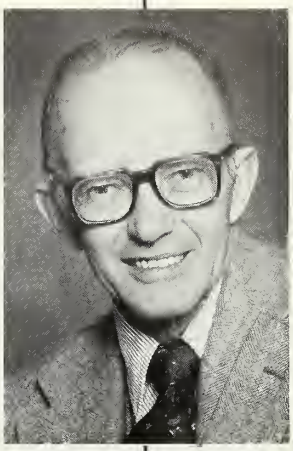
Don Etchison, Chairman

As director of the Illinois Department of Energy and Natural Resources, Don Etchison is also the chairman of the Illinois Coal Development Board. Before his appointment as director of ENR, he served as director of the Illinois Department of Nuclear Safety and as an assistant to Governor James R. Thompson on environmental, energy and natural resource issues. He earned a doctoral degree from the University of Miami, a master's degree from Southern Illinois University at Carbondale, and a bachelor's degree from Eastern Illinois University. Director Etchison has written, taught and lectured on topics ranging from international affairs to nuclear power.

Theodore Bean

Theodore Bean is vice president of transportation and marketing for Freeman United Coal Mining Company, headquartered in Chicago. Before joining Freeman United, he was employed by Burns & McDonnell Engineering Company as chief of the resource evaluation section. Mr. Bean is a registered professional engineer and land surveyor. He obtained bachelor's and master's degrees in civil engineering from Kansas State University.

Wilbur Dodge



Wilbur Dodge was employed by Caterpillar Tractor Company as manager of environmental control until April 1983. During his 33 years with the company, he held several supervisory positions in the Office of Plant Engineering and in the design construction division. He is currently a private consultant. Mr. Dodge has been active in professional and social service organizations and organized the Coalition for Increasing Utilization of Bituminous Medium and High Sulfur Coal. He received a bachelor's degree in mechanical engineering from the University of Illinois.

Linda Dutcher

Linda Dutcher is a consulting geologist in Carbondale, Illinois. She received bachelor's and master's degrees in geology from the State University of New York at Buffalo and a doctoral degree in geology from Pennsylvania State University. Mrs. Dutcher has held positions as an economic geologist, an exploration geologist and a senior geologist. She has also authored publications on geology.

Ralph Dunn

Ralph Dunn is a state senator from DuQuoin, Illinois. He was elected to the Illinois Senate in 1984 after serving 12 years in the House of Representatives. He is a member of the legislative committees on higher education, appropriations, and elementary and secondary education, and is co-chairman of the Citizens Council on Energy Resources.

Porter Womeldorff

Porter Womeldorff has been employed by Illinois Power Company since 1954, holding the positions of engineer, results supervisor, instrumentation engineer, supervisor of planning, and manager of planning. He was appointed vice president in 1979. He serves on the Advanced Fossil Division Committee for the Electric Power Research Institute and on the advisory committees for the College of Engineering at Southern Illinois University at Carbondale, the University of Illinois, and the University of Illinois' Energy Resource Center in Chicago. Mr. Womeldorff also heads the deployment task force for the Clean Coal Coalition and chairs the Utility Coal Gasification Association. He received a bachelor's degree in electrical engineering from the University of Illinois and has done graduate work at the University of Illinois and the University of Michigan.

Dean Bair

Dean Bair serves as the designated representative to the board for the director of the Illinois Department of Commerce and Community Affairs. As manager of DCCA's Office of Coal Commerce, Mr. Bair is responsible for marketing Illinois coal. He previously worked as industrial development representative for the Illinois Department of Business and Economic Development and for the Illinois Attorney General. He has a bachelor's degree in business administration.

Richard Shockley

Richard Shockley is director of the Illinois Department of Mines and Minerals. He retired from Inland Steel Coal Company as manager of administration in 1986. He joined Inland in 1952, serving as mining engineer, assistant chief engineer, assistant superintendent of mines, chief engineer and manager of engineering before being promoted to manager of administration in 1979. He holds a bachelor's degree in mining engineering from Virginia Polytechnic Institute and State University. He also was graduated from the advanced management program at Indiana University's School of Business.

Jim Rea

Jim Rea, a resident of Christopher, Illinois, served as a state representative for District 117 from 1979 to 1988. He was elected to the Illinois Senate in 1988. Senator Rea has served on the agriculture, rules, transportation and motor vehicles, business and economic development, human services, and aging committees in the Illinois House. He currently serves on Senate committees for elementary and secondary education, community and economic development, appropriations, and public health and corrections, and also serves as vice chairman of the agriculture and conservation committee. Senator Rea is also a member of the Citizens Council on Energy Resources. His academic background includes bachelor's and master's degrees from Southern Illinois University at Carbondale.

Edgar Hale

Edgar Hale has been employed in the coal industry for over 35 years, having worked in Illinois for Consolidation Coal and for Arch Mineral Corporation. A resident of Pinckneyville, Illinois, Mr. Hale served as a public member of the former Illinois Energy Resources Commission.

Photo not available

The Illinois Coal Research Program

The coal industry is facing a crucial period in its centuries-old history. Stringent acid rain control legislation could result in severe market losses for Illinois coal. The future of Illinois' coal industry will be greatly affected by the outcome of legislative proposals on the federal level and by the success of new technologies being developed through the Illinois Coal Research Program.

Although some technologies have reached the large-scale demonstration level and others have achieved some commercial success, the key to combating sulfur emissions from coal is still awaiting researchers in the laboratory. The exploratory and applied research programs sponsored by the Illinois Coal Development Board are dedicated to increasing the use of Illinois coal through development of environmentally safe cleaning and combustion methods.

Sulfur-In-Coal Research

Since 1982 the board has directed its research efforts toward the challenge of determining an economically feasible solution to the problem of sulfur in Illinois coal. During 1987-1988, $2.5 million in research funds were designated for investigation into practical methods of removing the sulfur. The research objectives established for 1988-1989 reinforce the board's commitment to achieving this goal:

- Coal Cleaning
  Producing clean coal by chemical, microbial and physical removal of sulfur (organic and/or inorganic) or other noxious elements

- Combustion
  Developing combustion technologies and testing new fuels from coal

- Fuels and Chemicals from Coal
  Preparing or using clean solids produced from coal, such as char, and studying liquefaction and gasification techniques, coal-liquid slurries, and chemical feedstocks from coal

- Coal Characterization
  Characterizing physical, chemical and molecular structures of coal, provided the characterization relates strongly to problems caused by sulfur or other noxious elements in coal

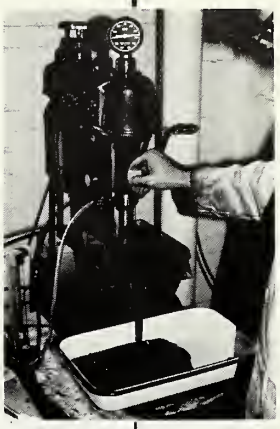
- Related Desulfurization Studies
  Studying market and regulatory economics, comparative process economics, materials of construction, and waste management issues related to sulfur in Illinois coal

- Gas Cleanup
  Researching Flue Gas and Hot-gas Cleanup

The Illinois Coal Development Board oversees the Illinois Center for Research on Sulfur in Coal (CRSC). Located in Champaign, Illinois, the nationally known CRSC administers a state-sponsored research program at various Illinois institutions. Quarterly and annual reports on research results are available from the CRSC.

Researchers representing many disciplines from both the public and private sectors are encouraged to collaborate and use the considerable capabilities offered by the research facilities of the Illinois State Geological Survey, the CRSC, universities, and other institutions throughout the state. Successful results will require such collaborative efforts among the wide-ranging disciplines and expertise found in scientific institutions, universities and industry. Researchers from the Geological Survey, Eastern Illinois University, Northwestern University, and Southern Illinois University at Carbondale are among several who have already formed collaborative arrangements.

The program also continued the cost-sharing initiative begun last year with such organizations as the U.S. Department of Energy, the Electric Power Research Institute and the Gas Research Institute. These shared-cost projects broaden the resource and information bases for studies of Illinois coal.



Through access to common coal specimens, the CRSC program's coal sample bank further augments the resources available to researchers by reducing the associated costs and extending the range of experimentation. In addition to the five representative Illinois coal samples, users of the coal sample bank now have the opportunity to perform comparative studies on an Indiana coal specimen, through the cooperation of the Indiana Energy Development Board and the Indiana Geological Survey.

Mine Subsidence Research

The Illinois Mine Subsidence Research Program is a successful cost-sharing effort that began in 1985 with an agreement between the Illinois Department of Energy and Natural Resources and the U.S. Bureau of Mines. Surface subsidence related to underground mining has presented extensive land use problems for the agriculture and mining industries of Illinois. This program focuses on finding underground mining methods that will benefit both industries by extracting maximum amounts of coal while simultaneously safeguarding land resources.

The public information efforts of the program were expanded this year to increase awareness of the longstanding problem and the need for the program. Several publications and informational exhibits acquainted industry, public and scientific audiences with program objectives.

The Illinois State Geological Survey oversees the program's research at the Survey, the University of Illinois, Southern Illinois University at Carbondale, and Northern Illinois University.

The Illinois Coal Demonstration Program

Promising technological advances developed from coal in research laboratories can progress toward commercialization through the coal demonstration program. Potential demonstration projects must exhibit qualities of eminent commercial readiness, economic feasibility, significant innovation, and environmental acceptability before reaching this level. To date, more than $64 million in state monies has funded 12 large-scale demonstration projects to prove the applicability of innovative clean coal technologies.

This original funding has resulted in additional investments of almost $500 million from private sources. The Illinois Coal Demonstration Program exemplifies a successful partnership between the public and private sectors, in which the burden of technical and financial risk is shared between them.

Advanced Utility Power Systems

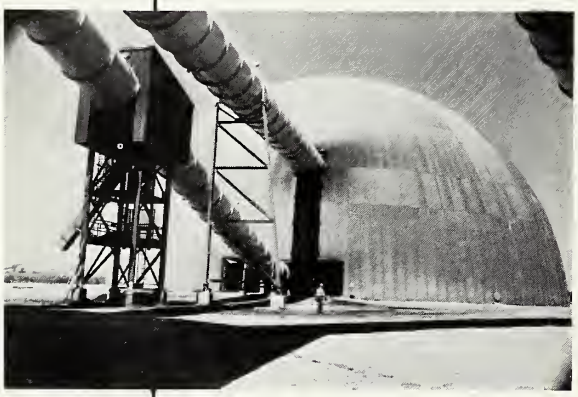
Utilities currently comprise the largest sector of the market for Illinois coal. Increasing the use of high-sulfur coal as a competitive fuel source for electrical energy has therefore become imperative. The Coal Development Fund is supporting demonstrations of the technologies involved in flue gas desulfurization and sorbent injection as viable means of using high-sulfur coal in utilities.

Flue gas desulfurization systems, traditionally known as "scrubbers," are still the primary method of controlling pollutants from new utility installations. Major improvements in scrubber systems are required to aid ailing Illinois coal markets. Although less effective in reducing noxious emissions, the technology of sorbent injection is attractive because of its low costs and capability of being retrofitted to existing boilers.

The University of Illinois' Abbott Power Plant, the largest state-owned power plant and the nation's largest university power plant, stopped using coal in 1972 when it was decided that conversion to oil and gas made more economic sense than did the installation of equipment that now would bring the facility into compliance with environmental emission standards.

Through funding from the Coal Development Fund, three of the Abbott boilers have been reconverted to burn coal through the installation of a Chiyoda Thoroughbred (CT-121) flue gas desulfurization system. The CT-121 chemically changes the noxious elements into nonpolluting, salable gypsum. Because the CT-121 is designed to be highly efficient without the additional components required by conventional limestone scrubbers, the system is more reliable and cost efficient.

Reconversion and installation costs have been estimated at $21.9 million, with $4.95 million coming from the Coal Development Fund. Capital development bond funds provide the balance of funding, and the Electric Power Research Institute is supporting a program to test and evaluate the system.



The CT-121 has been operating since April 1988, consistently removing 95 percent of the sulfur dioxide and producing a waste product of high-quality gypsum. The gypsum is undergoing testing by several manufacturers for inclusion in their products. The new system uses about 100,000 tons of high-sulfur Illinois coal and 9,000 tons of limestone annually. It is projected that the use of coal for heating, cooling and electricity generation will save the university at least $5 million annually.

Commonwealth Edison's Kincaid Station in Christian County will test a copper oxide desulfurization process co-sponsored by the State of Illinois, the U.S. Department of Energy, Commonwealth Edison Company and UOP, Inc. This dry and regenerable process uses an alumina-based copper oxide sorbent in a fluidized bed reactor to remove more than 90 percent of the sulfur dioxide and nitrogen oxide from flue gas. The Coal Development Fund is providing $1 million for the project, which is now estimated to cost $7.7 million. The three-year project successfully completed phase I and is now making progress into proof of concept facility design and construction.

The gas reburning-sorbent injection (GR-SI) process is a promising and relatively inexpensive technology that is expected to reduce the amounts of nitrogen oxide and sulfur dioxide released from utility boilers by 50 percent. This is the first involvement by the state in the multibillion-dollar federal Clean Coal Technology Program.

The Energy and Environmental Research Corporation of Irvine, California, will demonstrate the process on three different types of boilers at power plants belonging to the Central Illinois Light Company; City Water, Light and Power; and Illinois Power Company. The reburning process involves injection of natural gas into the boiler above the heat release zone to reburn the flue gas. In the subsequent phase, calcium-based sorbents injected into the boiler react with the coal's sulfur dioxide to form a removable solid. The federal government is providing $15 million, the Gas Research Institute has contributed $10 million, and the state's Coal Development Fund has committed $5 million to the demonstration program, which is expected to be completed in four years.

The U.S. Department of Energy, Pittsburgh Energy Technology Center (PETC), sponsored a Flue Gas Cleanup (FGC) program to promote the widespread use of coal by providing the technologies necessary for its use in an environmentally and economically acceptable manner. One area of work being carried out under the FGC program is related to Acid Rain Control Technology (ARCT).

Radian Corporation responded to the PETC/ARCT solicitation with a 1-megawatt in-duct injection pilot testing/modeling for SO_2 control proposal that provides for the design, construc-

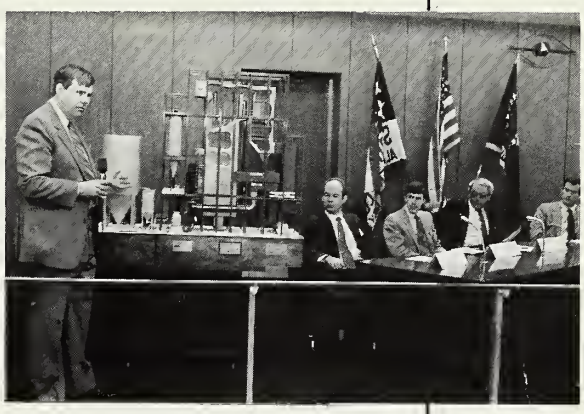
tion and testing of a pilot test unit to use a slipstream of flue gas from a coal-fired boiler at the Central Illinois Power Company's Meredosia Station. The project will examine the injection of calcium-based sorbents, both as a slurry and as a dry powder, at various locations between the air preheater and the electrostatic precipitator.

This $4.3 million, 28-month pilot project is co-funded by the U.S. Department of Energy ($3.7 million) and the State of Illinois ($600,000). Results from the project will provide a better understanding of the transport and chemical processes within the duct and the downstream collection of spent sorbent and particulate matter.

The U.S. Department of Energy's Innovative Clean Coal Technology (ICCT) program, the second round of a five-year, $2.5 billion program, provided $525 million in federal dollars to fund up to 50 percent of the costs of projects that use emerging technologies that are cost effective in controlling SO_2 and NO_x in coal-burning facilities. The aim of the ICCT program is to give industrial and utility coal users as many technological options as possible to enable them to meet present and future air pollution requirements without curtailing their efficiency.

The expanded Clean Coal Technology program attracted 54 proposed projects, valued at more than $5.3 billion, to demonstrate a new generation of cleaner and more efficient pollution control and power-generating options for the nation's coal industry.

Ten proposals from throughout Illinois totalling more than $500 million were submitted to the U.S. Department of Energy for consideration in the second round of the ICCT program. Two Illinois proposals were selected to receive federal funds.



The Combustion Engineering, Inc., Integrated Gasification Combined Cycle (IGCC) project will demonstrate the repowering of a 20-megawatt steam turbine and will add 40 megawatts of gas turbine generating capacity at the City Water, Light and Power Lakeside Station in Springfield. This IGCC project will use an airblown gasifier designed by Combustion Engineering, Inc. and a GE gas turbine. The three-phased, nine-year project is estimated to cost $264 million. The State of Illinois has committed up to $32 million toward the design and construction of the demonstration unit. The U.S. Department of Energy will provide nearly $130 million.

The TransAlta Resources Investment Corporation was also selected for federal funding under the ICCT program. The TransAlta project will retrofit an existing 33-megawatt cyclone boiler at the Southern Illinois Power Cooperative in Marion, Illinois, using the TransAlta Low NO_x/SO_x Burner, and will demonstrate the ability to control SO_2 and NO_x at the source of combustion while meeting New Source Performance Standards. Total cost of the project has been estimated at $13.5 million with the U.S. Department of Energy providing $6.8 million and the State of Illinois providing $2.7 million. Project duration is expected to be 24 months.

Advanced Industrial-Scale Systems

The economic welfare of Illinois is deeply dependent on the status of the state's considerable industrial base. Reducing industry operating expenses by lowering fuel costs through the use of improved technologies offers benefits for everyone.

The fluidized bed combustion (FBC) system has long been recognized as an economically and environmentally sound method for converting industrial facilities to Illinois coal use. The technology involves burning coal with inert materials, such as limestone, in an upward current of air in the combustion bed of a boiler. The air current causes the particles in the bed to behave like a liquid. The technology is efficient and provides simple, economical pollution control. More than 90 percent of sulfur dioxide gases can be removed when limestone is added

to the combustion chamber. The lower combustion temperatures required by the system also inhibit production of nitrous oxides.

Initiated in 1977, the fluidized bed combustion boiler system at Great Lakes Naval Training Center near Waukegan, Illinois, was the first FBC project supported by the coal demonstration program. Begun in 1979 and completed in 1981, this prototype for commercial units operated through spring 1984, removing 92 percent of sulfur and reducing nitrous oxide emissions to approximately half the regulatory limit. The state's commitment to this $27 million project was $750,000.

The five coal-fired Keeler/Dorr-Oliver circulating fluidized bed boilers operating at the Archer-Daniels-Midland Company (ADM) grain processing plant in Decatur, Illinois, are acknowledged as the largest industrial cogeneration system in the world. Performance results during the initial operating months have exceeded expectations. Burning coal to generate the steam and electricity required by the plant has enabled ADM to lower operating costs, resulting in a permanent market for the coal produced by 500 Illinois miners each year.

As agreed, ADM is supplying free hot water from its boiler plant to Richland Community College to meet the heating and cooling needs of the campus for 10 years, saving the college $74,000 annually. The Coal Development Fund contributed $6 million to the $100 million project that is expected to save ADM $70 million each year.

The BFGoodrich Chemical Group is demonstrating an advanced circulating fluidized bed combustion boiler at the company's chemical plant in Henry, Illinois. The project's 125,000-pound per hour Pyroflow boiler produces steam to drive the topping turbines and supply the plant's heating and processing needs.

As with first generation FBC technology, the boiler uses limestone to capture sulfur dioxide emissions during combustion, but the circulating design facilitates much better limestone usage and offers higher combustion efficiency. The system uses 50,000 tons of Illinois coal and 14,000 tons of limestone each year. The performance results show promise both environmentally and commercially, by virtue of the high availability and efficiency rates and the favorable operating and maintenance costs.

The project is now in its third year of the three-year demonstration period. The Coal Development Fund contributed $4.3 million to the $21.3 million project.

Officials at Anderson Clayton Foods, Inc., found a way to fight rising business costs by retrofitting an existing boiler at their Jacksonville, Illinois, plant for coal-firing. The Wormser dual fluidized bed combustion boiler is designed to burn 26,000 tons of Illinois coal and use 6,300 tons of limestone annually to provide the company with its primary steam production. The Wormser technology makes it possible to retrofit an exisiting gas- or oil-fired boiler to coal at lower costs than a new conventional coal-fired boiler, while simultaneously providing effective pollution control and increased generating capacity.

Anderson Clayton projections estimate that the conversion saves the company about $1.6 annually. The state committed $1 million to the project's $5.15 million total cost.

Commercial Development and Coal Marketing

In addition to the strong commitment to supporting Illinois' coal industry through funding for research and demonstration, the state's coal office also actively promotes increased coal usage in current and prospective markets. Users of Illinois coal within the state can get assistance with assessment and financial aspects of coal projects through the Illinois Coordinated Review Process and the Industrial Utilization Program. The Illinois Coal Marketing Program extends use of Illinois coal and technologies to national and world markets.

The Illinois Coordinated Review Process

The Illinois Coordinated Review Process is a voluntary governmental program that assists in the issuing of permits for major energy development projects that involve coal use. This process offers a comprehensive approach to project review, based on coordination of environmental and land use requirements, time frames and interagency relationships.

A project sponsor must request participation in the process. An interagency review board makes the decision on acceptance, based on the project's scope, impacts and development stage. A coordinated review team that includes representatives of appropriate federal and local agencies works with the sponsor on the review process. The team develops an agreement that details the responsibilities of the agencies and the project sponsor, and provides guidelines for all regulatory and public participation activities.

The Industrial Coal Utilization Program

Illinois industries interested in increasing their current coal usage or in converting their facilities to use clean coal technologies can apply for low-interest loans from the Industrial Coal Utilization Program. This year the Illinois legislature increased the amounts provided by this loan to $4 million or 60 percent of the project's total cost. Interest rates are not to exceed 5 percent. Loan recipients agree to the use of Illinois coal for the duration of the loan period, which varies from 7 to 10 years.

Funding decisions are based on amount of Illinois coal to be consumed, type and quantity of fuel, ability to meet environmental standards, technical merits, financial feasibility, and financial security provided by the applicant, if any. Department staff evaluates each project and presents a recommendation for funding to the Illinois Coal Development Board.

The Illinois Coal Marketing Program

Illinois state government took an active role in coal development when the General Assembly created the Coal Marketing Program in January 1987 as part of the Illinois Office of Coal Development and Marketing (OCDM). The statute (ch. 96 1/2, par. 7402, sec. 11) requires the Illinois Department of Energy and Natural Resources to operate an office of coal marketing, in cooperation with the Illinois Department of Commerce and Community Affairs, for the promotion and marketing of Illinois coal both domestically and internationally. As research and demonstration projects have represented the largest expenditures for coal development at both the state and federal levels, the State of Illinois has placed increasing emphasis on protecting and expanding its coal markets.

With the advent of the Coal Marketing Program, the OCDM has sought to publicize Illinois' business climate, its transportation infrastructure and its vast bituminous coal resources. In addition, the OCDM has sought specifically to promote coal not only as an abundantly available commodity from the Illinois coal industry, but also as an energy resource that is compatible for widespread use with emerging clean coal technologies.

The overall objective of the Coal Marketing Program is to help Illinois industry penetrate new domestic and international markets for Illinois coal and coal-burning technology. Since sales of coal and the technology to burn it are critical to the success of the state's coal-marketing effort, ways to promote coal and clean coal-burning technology have received, and will continue to receive, major emphasis.

To promote coal and coal-burning technology effectively and to cultivate the proper response from the overseas business community, the OCDM helped to host technical exchanges to acquaint overseas visitors with Illinois coal and the successful demonstration of the state's program of innovative coal-burning technologies.

Over the past year, the OCDM initiated a series of informative marketing brochures highlighting major demonstrations of coal-fired technologies that have proved successful in testing or burning Illinois coal. In addition, the OCDM has drawn on the staffs of state offices, operated by the Illinois Department of Commerce and Community Affairs, in Brussels, Tokyo, Osaka and Hong Kong to help the Illinois coal industry keep in touch with overseas coal research and development and international coal trade.

The OCDM maintains a marketing office in Marion, Illinois, in the heart of southern Illinois' coal country. This office has facilitated ready contact between the Illinois coal industry and potential overseas buyers. As trade opportunities became available overseas and were made known to Illinois coal companies, this office assisted the coal companies in responding to these opportunities.

In its role as a facilitator of coal trade information, the Office of Coal Development and Marketing, in cooperation with the University of Illinois at Urbana-Champaign, has produced a computerized coal-marketing database that can provide such strategic information as the price and quality of all steam coal imported to a given country in a specific year, as well as the origin of that coal, the port to which it was exported and the name of the purchaser. The database is also designed to augment understanding of such items as: the characteristics of coal-fired boilers in a given area; the specifics of applicable environmental regulations for the place in question; a given locale's energy demand forecast; and the status, terms and conditions of the long-term steam coal contracts currently in effect.

The database is managed by a prototype computerized expert system designed specifically for decision makers in coal marketing to experiment with a variety of variables in order to answer "what if" questions regarding future events that can affect the world coal market.

The OCDM expects to expand the database and the expert system in the coming year to increase its store of information and to make this information more accessible to a wider audience of potential users.

Illinois Coal in Art

Coal is not only useful as a fuel, but also can be appreciated as an object of art. In an effort to make the public at large more aware of Illinois' most abundant fuel resource, ENR, in cooperation with the Illinois Arts Council, sponsored a statewide art competition featuring Illinois coal. Known as "Mineworks to Artworks: Illinois Coal in Art," the competition focused on Illinois' mining heritage.

Amateur and professional artists from across the state were invited to submit works of art in several media, depicting scenes in the life of coal communities throughout the state. Entry categories for media included pencil, pen and ink, charcoal, printing, photography and sculpture. This particular competition has given artists an opportunity to give expression to images indigenous to the state and its heritage and has served to promote artistic activities in the state as well.

The winning entries were selected by a panel of qualified arts professionals and displayed with the State of Illinois traveling coal exhibit during the run of the DuQuoin State Fair. Winners of this past year's competition were awarded hundreds of dollars in U.S. Savings Bonds.

Awards were presented for the following artwork:

"Midnights," a chalk pencil rendering of miners readying for the underground late shift, by Illinois coal miner Robert S. Allen of St. Louis, Missouri.

"Teamwork," a work in pencil depicting coal deliveries of yesteryear, by John Stribrny of Palos Park, Illinois.

"Gray Day at New National Mine," an oil painting of a coal mine closing, by Edward L. Karasek of Belleville, Illinois.

"Loading Southern Illinois Coal," an acrylic painting of a steam locomotive and tender taking on a load of coal, by Barry Mosley of West Frankfort, Illinois.

"Despair," a charcoal rendering of John L. Lewis at a mine disaster in West Frankfort, by W. Bryan Ellis of West Frankfort, Illinois.

State of Illinois Traveling Coal Exhibit

A new exhibit on Illinois' most abundant natural resource is available for display throughout the state.

The exhibit includes information on the history of coal; coal technologies that remove impurities, such as sulfur; and mining techniques and samples of coal, plant fossils, and minerals. Color photographs depict mining equipment, including some of the largest surface mining machines in the world and computerized underground machines that move tons of coal to the surface.

The display also informs the public about the state's coal production. Illinois is the fifth largest coal-producing state in the nation, mining about 60 million tons of coal annually. An estimated 181 billion tons of coal lie within Illinois borders.

The state's vast coal reserves were created more than 300 million years ago, when a huge peat swamp covered what is now central and southern Illinois. Through the centuries, seas inundated the swamp and left deposits of other materials. The resulting chemical reaction left veins of rich coal with sulfur woven into it.

The Illinois Department of Energy and Natural Resources prepared the exhibit in cooperation with the Illinois Coal Association and the Illinois Department of Mines and Minerals. The exhibit is part of ENR's coal marketing plan, which includes working with potential overseas clients and developing an international advertising campaign to market Illinois coal.

The Illinois State Museum displays the exhibit when it is not on loan.

Appendix: Coal Research Projects

Research Institutions Funded

Illinois State Geological Survey (ISGS)
Institute of Gas Technology (IGT)
Illinois State University (ISU)
Southern Illinois University at Carbondale (SIUC)
University of Illinois at Urbana-Champaign (UIUC)
University of Chicago (UC)
Eastern Illinois University (EIU)
Electric Power Research Institute (EPRI)
Indiana Energy Development Board (IEDB)
Center for Research on Sulfur in Coal (CRSC)
Argonne National Laboratory (ANL)
Northwestern University (NU)
Illinois Institute of Technology (IIT)
University of Illinois at Chicago (UIC)
Gas Research Institute (GRI)
Purdue University (Purdue)
Pittsburgh Energy
Technology Center (PETC)

List of research projects funded by the Illinois Coal Development Board from September 1, 1987 through August 31, 1988

Title of Project	*Principal Investigator*	*Institution*	*Amount Funded*
Coal Cleaning			
Advanced Physical Fine Coal Cleaning by ISGS Aggregate Flotation	R. B. Read	ISGS	$ 264,401
The ISGS Aggregate Flotation Process: Scale-Up Testing	J. A. FitzPatrick	NU	44,645
A Method for Dewatering, Agglomerating, and Pelletizing Cleaned Fine Coal	A. C. Kent	SIUC	58,216
Explosive Fracture Comminution Process for Coal Cleaning Using Supercritical Carbon Dioxide	R. Narayan	Purdue	79,000
Improvements in Fundamentals of Foam and Column Separation of Fine Coals	J. C. Slattery	NU	109,999
Chlorine Removal from Illinois Coal	C. B. Muchmore	SIUC	57,396
New Organic Desulfurization Chemistry	L. M. Stock	UC	101,424
Microbial Pyrite Suppression from Illinois Coals: Microbiology and Chemistry	J. B. Risatti	ISGS	65,333
Microbial Suppression of Pyrite from Illinois Coals: Engineering and Scale-Up	J. A. FitzPatrick	NU	77,828
Fuels and Chemicals from Coal			
Carbon Monoxide/Ethanol Desulfurization of Illinois High-Sulfur Coal	R. E. Hughes	ISGS	179,776
One-Step Conversion of Coal and Char to Gases and Liquids	G. V. Smith	SIUC	49,370

Production of Premium Liquids by Mild Gasification	M. D. Stephenson A. Williams	ISGS	62,450
Characterization, Stability, and Rheology of Coal-Water Slurries	R. M. Turian	UIC	77,862
Combustion			
Development of High Surface Area Hydrated Lime for Sulfur Dioxide Control	M. Rostam-Abadi	ISGS	$ 79,176
Hydrated Limestone Injection of SO_x Control during Staged Combustion	W. Swift	ANL	70,000
Combustion Characteristics of Coal-Derived Solid Fuels	M. Rostam-Abadi	ISGS	81,338
Flammability Characteristics of Desulfurized Illinois Coal and Char	R. O. Buckius	UIUC	79,039
Combustion of Coal-Derived Low Volatile Fuels in a Slagging Combustor	W. Swift	ANL	82,000
Circulating Fluidized Bed Combustion of Fuels Derived from High-Sulfur Coals	S. Rajan	SIUC	46,987
Coal Characterization			
Characterization of Organic Sulfur Compounds in Coals and Pure Macerals	J. C. Crelling	SIUC	137,785
Separation of Coal into Maceral Groups	J. E. Young	ANL	132,000

List of cost-shared research projects funded by the Illinois Coal Development Board from September 1, 1987 through August 31, 1988

Title of Project	*Principal Investigator*	*Institution*	*Amount Funded*
Coal Cleaning			
Evaluation of Reagent Selectivity in Flotation of Ultrafine Coal via the Use of the Bechtel Microbubble Process	R. R. Ruch	EPRI & PETC	$ 13,585
Microbial Removal of Organic Sulfur	B. Klubeck D. Clark	PETC & SIUC	40,383
Coal Desulfurization Using Perchloroethylene	D. Buchanan	EPRI & EIU	120,000
Fuels and Chemicals from Coal			
U-Gas One-Step Desulfurization	A. Rehmat	IGT	50,000
Characterization			
High-Sulfur Coal Research: Cleaning and Characterization	Various	EPRI	300,000 over 2.5 years
Other Activities			
Illinois Basin Coal Sample Program	C. W. Kruse	IEDB	26,985
Related Desulfurization Studies			
The Utility Market for Desulfurized Coal	C. Kolstad	UIUC	$59,805
Chlorine-Induced Corrosion in the Processing and Utilization of Illinois Coal	J. H. Swisher	SIUC	29,774
Corrosion of Components in Energy Conversion Systems Attributed to Chlorine	M. McNallan	UIC	38,881
Factors Affecting Management of ISGS Aggregate Flotation Waste Solids	G. Dreher	ISGS	83,882
Gas Cleanup			
Hot Coal Gas Desulfurization by Metal Oxides: Effect of Secondary Contaminants	P. G. Wapner	SIUC	69,089
Other Activities			
Information System on Illinois Coal IV: A Combined Database	C. B. Trask	ISGS	12,553

List of research projects funded by the Illinois Coal Development Board from September 1, 1986 through August 31, 1987

Title of Project	*Principal Investigator*	*Institution*	*Amount Funded*
Coal Cleaning			
Distribution of Sodium, Chlorine and Sulfur in Illinois Coals, Removed by Physical Cleaning and Their Behavior During Combustion	C. L. Chou	ISGS	$ 81,276
ISGS Aggregate Flotation Fine Coal Cleaning Process: Part A-Development Characterization and Testing; Part B-Modeling and Evaluation	H. P. Ehrlinger	ISGS	208,006
Electrostatic Desulfurization of Illinois Coal	D. Gidaspow	IIT	85,264
Improvements in Fundamental Understanding of Foam and Flotation Separation of Fine and Ultra-Fine Coals	J. C. Slattery	NU	124,899
New Organic Desulfurization Chemistry	L. M. Stock	UC	95,541
Microbially Enhanced Physical Separation of Pyrite and Ash from Illinois Coal: Part A-Mechanisms and Enhancement of Pyrite Suppression; Part B-Development of Screening Methodology and Engineering and Evaluation	J. B. Risatti	ISGS	120,900
Fuels and Chemicals from Coal			
Part A-Process Engineering of Coal Desulfurization: Thermal-Chemical Treatment and Magnetic Separation Techniques; Part B-Desulfurization of Illinois Coal Using Combined Thermal and Magnetic Methods	M. D. Stephenson	ISGS	169,936
Carbon Monoxide-Ethanol Desulfurization of Illinois High-Sulfur Coal	R. E. Hughes	ISGS	110,395
Steam-Enhanced Oxidative Desulfurization	S. L. Soo	UIUC	63,568
Coal Characterization			
Characterization of Illinois Coal: Correlation of Chemistry with Petrography	D. H. Buchanan	EIU	78,180
Separation and Desulfurization of Pure Macerals: Part A-Chemical Desulfurization of Pure Maceral Fractions; Part B-Separation of Coal Macerals from Illinois High-Sulfur Coal and Characterization of Organic Sulfur Species and Thermal Conversion Properties of These Macerals	J. C. Crelling	SIUC	180,390

Mapping Coal Molecular Structure with ESE Spectroscopy	R. B. Clarkson	UIUC	79,503
Forms of Sulfur: Fractionation Scheme for Coal Pyrolysis Products	C. Chaven	UIUC	38,825
Combustion			
Reactivity and Combustion Properties of Coal and Coal-Derived Solid Fuels: Part A-Sample Preparation, Characterization and Reactivity Measurements; Part B-Fluidized-Bed Combustion Testing	M. Rostam-Abadi	ISGS	92,473
Flammability Characteristics of Desulfurized Illinois Coal	R. O. Buckius	UIUC	66,779
Coal Desulfurization Studies in Atmospheric and Pressurized Fluidized Bed Combustors: Erosions, Heat Transfer and Hydrodynamics	S. C. Saxena	UIC	50,000
Utilization of High-Sulfur Coal and New Fuel Derivatives in Circulating Fluidized Bed Combustors	S. Rajan	SIUC	38,856
Related Desulfurization Studies			
Marketing Survey and Assessment of Potential for Desulfurized Illinois Coal	C. D. Kolstad	UIUC	64,409
Gas Cleanup			
Coal Gas Desulfurization by Hot Copper Sorbents	P. G. Wapner	SIUC	35,453
Other Activities			
Location of Isotopically Characterized Coal Samples	K. C. Hackley	ISGS	29,250
Coal Information System	C. B. Trask	ISGS	12,031
Coal Sample Bank	C. W. Kruse	ISGS	15,000
Assessment of Chemical Feedstock Production from Illinois Coal	S. P. Babu	IGT	100,000
Illinois Mine Subsidence Research	P. DuMontelle	ISGS	84,864
Surface Subsidence Monitoring at Shallow Partial-Extraction Room-and-Pillar Mine	Y. P. Chugh	SIUC	22,262
Laboratory and Field Characterization of Immediate Floor Strata Associated with Coal Mining in Illinois	Y. P. Chugh	SIUC	131,668
Hydrologic Changes as They Affect Agricultural Soils	R. G. Darmody	UIUC	31,258
Crop Production Studies in Areas of High Extraction	R. G. Darmody	UIUC	42,948

Fuels and Chemical from Coal			
Integrated Study of Chemical and Mineralogical Behavior of Sulfur in Coal During Pyrolytic and Oxidative Desulfurization-II	D. D. Coleman	ISGS	$ 80,065
Low-Temperature Charring: Char Desulfurization and Agglomeration Reduction	C. W. Kruse	ISGS	157,001
Simultaneous Desulfurization and Conversion of Coal Under Super-Critical Conditions	C. B. Muchmore	SIUC	120,000
Desulfurization of Illinois Coal by In-Situ Preparation of Iron Sulfide Catalysts: III	G. V. Smith	SIUC	148,000
Steam-Enhanced Oxidation Desulfurization	S. L. Soo	UIUC	43,000
Characterization and Rheology of Coal Suspensions	R.M. Turian	UIC	58,000
Coal Characterization			
Nature and Reactivity Patterns of Organic Sulfur Compounds in Illinois Coal	L. M. Stock	UC	*74,723
Characterization of Petrographic Properties, Organic Sulfur Species and Thermal Conversion Properties of Coal Macerals from Illinois High-Sulfur Coal	J. E. Young	ANL	100,000
Characterization of Petrographic Properties and Organic Sulfur Distribution in Maceral Fractions of Illinois Coal	J. C. Crelling	SIUC	50,000
Characterization of Organic Sulfur Types in Coal: II	G. V. Smith	SIUC	77,000
Mapping Coal Molecular Structure with ESE Spectroscopy	R. B. Clarkson	UIUC	76,000
Organic Sulfur in Illinois Coal	C. A. Wert	UIUC	42,000
Chemical Characterization of Functional Groups in Illinois Coal by Pyridine Hydriodide	D. H. Buchanan	EIU	53,657
Organic Solvent Extraction for Characterization of Coal	J. A. Cox	SIUC	22,000
Combustion			
Flammability Characteristics of Desulfurized Coal	R. O. Buckius	UIUC	64,000
Study of Motions of Solids and Mixing in Gas-Fluidized Beds	M. M. Chen	UIUC	78,000

Related Desulfurization Studies			
Evaluation Engineer	D. D. Banerjee	CRSC	42,000
Support of Economic Evaluation Work	D. D. Banerjee	CRSC	45,264
Gas Cleanup			
Coal Gas Desufurization by Hot Copper Sorbents	P. G. Wapner	SIUC	25,000
Other Activities			
Information System on Illinois Coal II: Characterization of Samples in Illinois Basin Coal Sample Program	R. D. Harvey	ISGS	19,743
Technology Transfer	W. L. Wells	CRSC	20,000
Coal Sample Bank	C. W. Kruse	ISGS	54,014
Assessment of Chemical Feedstocks Production From Illinois Coal	S. P. Babu	IGT	63,000
Illinois Mine Subsidence Research	P. DuMontelle	ISGS	70,615
Laboratory and Field Characterization of Immediate Floor Strata Associated with Coal Mining in Illinois	Y. P. Chugh	SIUC	66,356
Crop Production Studies in Areas of High Extraction	R. C. Darmody	UIUC	70,615

*This was a two-year project grant.

List of research projects funded by the Illinois Coal Development Board from September 1, 1985 through August 31, 1986

Title of Project	*Principal Investigator*	*Institution*	*Amount Funded*
Coal Cleaning			
Open-Bore Superconducting Magnet	C. D. Livengood	ANL	$ 81,000
Beneficiation of Coal: Distribution of Sodium, Chlorine and Sulfur in Illinois Coals, Removal by Physical Cleaning and Their Behavior During Combustion	C. L. Chou	ISGS	70,000
ISGS Aggregate Flotation Fine Coal Cleaning Process: Parts A & B	H. P. Ehrlinger	ISGS	183,979
Process Model Development for Fine Cleaning of Illinois Coal	J. A. FitzPatrick	NU	77,010
Characterization and Removal of Chlorine in Illinois Coal	H. L. Chen	SIUC	38,000
Electrostatic Desulfurization of Illinois Coal	D. Gidaspow	IIT	79,345
Ultra-Clean, Ultra-Fine Fuel Derived from Illinois Basin Coal	H. M. Foster	SIUC	120,000
Integrated Two-Step Process for Ultra-Fine, Ultra-Clean Coal	K. S. Vorres	ANL	125,000
Coal Desulfurization by Electrolysis	S. B. Lalvani	SIUC	25,000
Rates of Microbial Removal of Organic and Inorganic Sulfur from Illinois Coals and Coal Chars	J. B. Risatti	ISGS	62,955

List of research projects funded by the Illinois Coal Development Board from September 1, 1984 through August 31, 1985

Title of Project	*Principal Investigator*	*Institution*	*Amount Funded*
Coal Cleaning			
Open-Bore Superconducting-Magnet Beneficiation of Coal	C. D. Livengood	ANL	$ 70,000
Limits of Removal of Sulfur, Chlorine and Trace Elements from Fine Coal: Aggregate Flotation Application II	R. R. Ruch	ISGS	121,514
Characterization and Removal of Chlorine and Sodium from Illinois Coal	C. L. Chou	ISGS	77,612
Chlorine in Illinois Coal	H. L. Chen	SIUC	28,000
Process Model Development for Simulation of Fine Coal Cleaning	J. A. FitzPatrick	NU	45,400
Electrostatic Desulfurization of Illinois Coal	D. Gidaspow	IIT	76,542
Sulfur Removal from Coal by Electrolysis	S. B. Lalvani	SIUC	17,996
Fuels and Chemicals from Coal			
Integrated Study of Chemical and Mineralogical Behavior of Sulfur in Coal During Pyrolytic and Oxidative Desulfurization	D. D. Coleman	ISGS	61,008
Low-Temperature Charring: Oxidative Desulfurization and New Approaches to Aggregation Problem	C. W. Kruse	ISGS	85,653
Simultaneous Desulfurization and Conversion of Coal Under Super-Critical Conditions-III	C. B. Muchmore	SIUC	88,350
Coal-Derived Feedstock by Super-Critical Extraction	J. W. Chen	SIUC	34,410
Desulfurization of Illinois Coal by In-Situ Preparation of Iron Sulfide Catalysts	G. V. Smith	SIUC	196,578
Design Techniques for Desulfurization of Illinois Coal by Super-Critical Fluid Extraction	C. A. Eckert	UIUC	64,635
Chemistry of Iron Sulfides in Coal: Coal Characterization and Desulfurization Strategies	T. B. Rauchfuss	UIUC	67,334

Characterization and Rheology of Coal Suspensions	R. M. Turian	UIC	39,861
Coal Characterization			
Distribution of Organic Sulfur in Maceral Fractions of Single Coals	J. C. Crelling	SIUC	69,269
Characterization of Organic Sulfur Types in Coal	G. V. Smith	SIUC	45,000
Measurement of Organic Impurities in Coal	C. A. Wert	UIUC	36,000
Nature and Reactivity Patterns of Organic Sulfur Compounds in Illinois Coal	L. M. Stock	UC	* 74,723
Determination and Speciation of Chlorine in Coal	J. A. Cox	SIUC	16,000
Combustion			
Mixing, Segregation and Elutriation in Polydispersed Fluidized Beds Relevant to Sulfur Removal	M. M. Chen	UIUC	71,200
Related Desulfurization Studies			
CRSC Evaluation Engineer	W. L. Wells	CRSC	32,000
Other Activities			
Information System on Chemistry of Illinois Coal	R. D. Harvey	ISGS	10,153
Coal Sample Bank	C. W. Kruse	ISGS	10,000

* This was a two-year project grant.

List of research projects funded by the Illinois Coal Development Board from January 1, 1984 through August 31, 1984

Title of Project	*Principal Investigator*	*Institution*	*Amount Funded*
Coal Cleaning			
Limits of Removal of Sulfur, Chlorine and Trace Elements from Fine Coal: An Aggregate Flotation Application	R. R. Ruch	ISGS	$ 86,991
Characterization and Removal of Chlorine and Sodium from Illinois Coal	C. L. Chou	ISGS	10,022
Chlorine in Illinois Coal	H. L. Chen	SIUC	9,999
Fuels and Chemicals from Coal			
Application of Stable Isotope Variations to Coal Desulfurization	D. D. Coleman	ISGS	10,010
Chemical Methods for Char Desulfurization II: Chemical Characterization of Desulfurization Products from Coal	R. A. Griffin	ISGS	10,000
Low-Temperature Charring	C. W. Kruse	ISGS	58,000
Simultaneous Desulfurization and Coal-Derived Feedstock by Super-Critical Extraction	C. B. Muchmore J. W. Chen	SIUC	102,000 11,000
New Coal Desulfurization Strategies	T. B. Rauchfuss	UIUC	20,000
Desulfurization of Illinois Coal by In-Situ Preparation of Iron Sulfide Catalysts	G. V. Smith	SIUC	87,976
Coal Characterization			
Sulfur Determination in Coal	C. A. Wert	UIUC	46,000
Characterization of Iron-Sulfur Compounds in Coal and Coal Chars by Moessbauer Spectroscopy	P. G. Debrunner	UIUC	24,000
EPR and ENDOR Studies of Radicals in Illinois Coal	R. B. Clarkson	UIUC	4,950
Role of Sulfur Compounds in Coal Conversion Reactions	L. M. Stock	UC	*66,011
Pyrite Size Measurement II	P. D. Robinson	SIUC	23,004

Combustion

Flammability Characteristics of Desulfurized Illinois Coal	R. O. Buckius	UIUC	46,000
Experimental Determination of Motion of Solids in Fluidized Beds	B. T. Chao	UIUC	23,000

*This was a two-year project grant.

List of research projects funded by the Illinois Coal Development Board from January 1, 1983 through December 31, 1983

Title of Project	*Principal Investigator*	*Institution*	*Amount Funded*
Coal Cleaning			
Beneficiation of Fine Coal by Floc-Flotation	C. W. Kruse	ISGS	$ 42,999
Sonic Method of Coal Cleaning	R. Carty	IGT	77,154
Organic Sulfur Reduction via Carboxylation Reactions with Alkali in Protic Solvents	R. C. Duty	ISU	52,107
Microbial Desulfurization of Illinois Coal	D. E. Jerger	ISGS	89,762
Fuels and Chemicals from Coal			
Application of Natural Isotope Variations in Coal to Determine Organic Sulfur Forms and Desulfurization	D. D. Coleman	ISGS	47,964
Chemical Methods for Char Desulfurization	R. A. Griffin	ISGS	46,992
Low-Temperature Charring	C. W. Kruse	ISGS	63,998
Radioactive Tracer Study of Nature of Sulfur Removal During CFLT Charrign	R. R. Ruch	ISGS	23,003
Simultaneous Desulfurization and Conversion of Coal Under Super-Critical Conditions	C. B. Muchmore	SIUC	145,532
Coal-Derived Feedstock by Super-Critical Extractions	J. W. Chen	SIUC	54,968
Steam Heating of Coal for Conversion of Sulfur to Hydrogen Sulfide	S. L. Soo	UIUC	44,000
Chemical Methods for Char Desulfurization	T. B. Rauchfuss	UIUC	44,000
Desulfurization of Illinois Coal by In-Situ Preparation of Iron Sulfide Catalysts	G. V. Smith	SIUC	118,630
Coal Characterization			
Separation and X-Ray Characterization of Coal Macerals	J. C. Crelling	SIUC	16,500
Microchemical Analysis of Sulfides in Pyrolyzed Illinois Coal	C. A. Wert	UIUC	44,000

Characterization of Iron-Sulfur Compounds in Coal and Coal Chars by Mossbauer Spectroscopy	P. G. Debrunner	UIUC	33,000
Magnetic-Resonance Study of Native Illinois Coal and Coal Chars	R. B. Clarkson	UIUC	33,000
Role of Sulfur Compounds in Coal Conversion Reactions	L. M. Stock	UC	*66,012
Chemical Characterization of Functional Groups Cleaved by Pyridinium Iodide	D. H. Buchanan	EIU	26,172
Sulfide Mineral Grain Size and Maceral Associations in Illinois Coals and Their Washed Products	R. D. Harvey	ISGS	25,044
Pyrite Size Measurement	P. D. Robinson	SIUC	16,500
Combustion			
Flammability Characteristics of Desulfurized Illinois Pulverized Coal	H. Krier	UIUC	27,500
Experimental Determination of Velocity of Solids and Gas Motion in Fluidized Beds	B. T. Chao	UIUC	24,500
Other Activities			
CRSC Administrative Support	R. E. Bergstrom	CRSC	73,600
Coal Sample Bank	R. E. Bergstrom	ISGS	12,000
Conferences and Meetings	R. E. Bergstrom	UIUC	14,400
Utilization of Organic Sulfur Compounds Found in High-Sulfur Coal or Formed in Processing High-Sulfur Coal: An Alternative Source of Petrochemicals	C. Y. Meyers	SIUC	16,500

* This was a two-year project grant.

List of research projects funded by the Coal Industry Committee from September 1, 1985 through December 31, 1986

Title of Project	*Principal Investigator*	*Institution*	*Amount Funded*
Coal Cleaning			
Ultra-Fine Coal Cleaning via Explosive Shattering and Aggregate Flotation Processes	R. R. Ruch	ISGS	$ 49,398
Desulfurization of Metallurgical and Steam Coals by Hybrid Agglomeration/Flotation Processes	J. A. FitzPatrick	NU	43,795
Optimizing Coal Cleaning/Pyrite Removal by Use of CIS-1, 2-Dialkylethenesolfonate Reagents: Correlation of Efficiency with Structure of Selectively Prepared and Characterized Reagents	C. Y. Meyers	SIUC	45,000
Fuels and Chemicals from Coal			
Pollution-Free Technique for Desulfurization of Coal Without Emitting Sulfur-Containing Gaseous Products	K. Upadhya	UIC	41,000
Coal Characterization			
NMR Spectroscopy as Structural Probe in Coal Chemistry	T. B. Rauchfuss	UIUC	50,000
Combustion			
Enhancement of SO_2 Absorption Capacity of Lime/Limestone via Explosive Shattering	M. Rostam-Abadi	ISGS	42,864
Enhanced Sulfur Capture by Hydrated Lime Sorbents in Two-Stage Slagging Combustors	K. M. Myles	ANL	70,000
Combustion Studies of Illinois Coal with Injected Limestone to Capture SO_2	H. Krier	UIUC	57,000
Other Activities			
Technology Transfer	W. L. Wells	CRSC	35,303
Coal Characterization			
Separation and X-Ray Characterization of Coal Macerals	J. C. Crelling	SIUC	16,500
Microchemical Analysis of Sulfides in Pyrolyzed Illinois Coal	C. A. Wert	UIUC	44,000
Characterization of Iron-Sulfur Compounds in Coal and Coal Chars by Mossbauer Spectroscoppy	P. G. Debrunner	UIUC	33,000

Magnetic-Resonance Study of Native Illinois Coal and Coal Chars	R. B. Clarkson	UIUC	33,000
Role of Sulfur Compounds in Coal Conversion Reactions	L. M. Stock	UC	*66,012
Chemical Characterization of Functional Groups Cleaved by Pyridinium Iodide	D. H. Buchanan	EIU	26,172
Sulfide Mineral Grain Size and Maceral Associations in Illinois Coals and Their Washed Products	R. D. Harvey	ISGS	25,044
Pyrite Size Measurement	P. D. Robinson	SIUC	16,500
Combustion			
Flammability Characteristics of Desulfurized Illinois Pulverized Coal	H. Krier	UIUC	27,500
Experimental Determination of Velocity of Solids and Gas Motion in Fluidized Beds	B. T. Chao	UIUC	24,500
Other Activities			
CRSC Administrative Support	R. E. Bergstrom	CRSC	73,600
Coal Sample Bank	R. E. Bergstrom	ISGS	12,000
Conferences and Meetings	R. E. Bergstrom	UIUC	14,400
Utilization of Organic Sulfur Compounds Found in High-Sulfur Coal or Formed in Processing High-Sulfur Coal: An Alternative Source of Petrochemicals	C. Y. Meyers	SIUC	16,500

*This was a two-year project grant.

United Coal Company (UCC)
Tennessee Valley Authority (TVA)
Foster Wheeler (F-W)

U.S. Department of Energy (DOE)
Combustion Engineering (C-E)
Babcock and Wilcox (B&W)

Actual cost-sharing projects for 1986-1987

Project Subject (Cosponsors)	*Principal Investigator*	*Institution*	*Project Budget (86-87 CRSC Amount)*
Coal Cleaning			
Ultra-Fine Coal Testing (UCC)	H. P. Ehrlinger	ISGS ($3,310)	$ 8,822
Fuels and Chemicals from Coal			
In-Situ Sulfur Capture in Gasifier Environment (GRI)	A. Rehmat	GRI ($50,000)	150,000
Coal Characterization			
Characterization of Coal-Chloride Evolution in Reducing Environment (EPRI)	S. Rajan	SIUC ($28,500)	57,000
Combustion			
Metal Wastage in Fluidized Bed Combustors (DOE, EPRI, TVA, B&W, C-E, F-W)	Various	($75,000)	1,000,000
Other Activities			
Bituminous Coal Desulfurization Research and Development (EPRI and Others)	Various	($120,000)	1,030,000

Coal Technology Demonstration Projects

Technology Application	*Title of Project/Year*	*Location*	*Participants*	*Project Cost*	*State $*
Advanced Industrial-Scale Systems	Shop-Assembled Atmospheric FBC Boiler Demonstration (1978)	U.S. Navy Great Lakes Training Station, N. Chicago, IL	U.S. DOE, Combustion Engineering, U.S. Navy, State of Illinois	$ 27,020,962	$ 750,000
	Advanced Atmospheric FBC Boiler-Cogeneration Demonstration (1983)	Pekin, IL	Midwest Grain Products, Foster Wheeler Corp., State of Illinois	12,265,000	2,500,000
	Advanced Circulating FBC Boiler Demonstration (1983)	Henry, IL	B.F. Goodrich Co., Pyropower, State of Illinois	19,300,000	4,300,000
	Dual Fluidized-Bed Retrofit Combustion Demonstration (1985)	Jacksonville, IL	Anderson Clayton Foods, Wormser Engineering, State of Illinois	5,150,000	1,000,000
	Large Circulating FBC Boiler-Cogeneration Demonstration (1986)	Decatur, IL	Archer-Daniels-Midland, Keeler/Don-Oliver, State of Illinois	100,000,000 +	6,000,000

Coal Technology Demonstration Projects

Technology Application	*Title of Project/Year*	*Location*	*Participants*	*Project Cost*	*State $*
Advanced Utility Power Systems	KILnGAS Low-Btu Coal Gasification Demonstration (1980)	Illinois Power Wood River Station, E. Alton, IL	U.S. DOE, Allis-Chalmers Corp., 12 electric utilities, EPRI, State of Illinois	$232,100,000	$35,850,000
	Advanced Flue Gas Desulfurization Scrubber Demonstration (1984)	U of I Abbott Power Plant, Champaign, IL	CICI, Inc, EPRI, State of Illinois	21,900,000	21,900,000
	Copper Oxide Flue Gas Treatment Process Demonstration (1987)	Com Ed Kincaid Station, Kincaid, IL	U.S. DOE, Commonwealth Edison, UOP, Inc., State of Illinois	7,550,000	1,000,000
	Gas Reburning-Sorbent Injection Flue Gas Treatment Process Demonstration (1987)	Illinois Power Hennepin Station, Hennepin, IL CILCO Edwards Station Bartonville, IL CWLP Lakeside Station, Springfield, IL	U.S. DOE, Gas Research Institute, Energy & Environmental Research Corp., State of Illinois	29,998,253	5,000,000
	1 Mw In-Duct Injection for SO_2 Control Demonstration (1987)	CIPS Meredosia Station, Meredosia, IL	U.S. DOE, State of Illinois, CIPS	4,300,000	600,000
	Integrated Gasification Combined Cycle Demonstration (1988)	CWLP Lakeside Station, Springfield, IL	U.S. DOE, State of Illinois, CWLP	264,000,000	32,000,000
	Low NO_x/SO_x Burner Demonstration (1988)	SIPCO Marion Station, Marion, IL	U.S. DOE, State of Illinois, SIPCO	13,576,000	2,715,000

DEPOSITORY

APR 04 1991

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

EXECUTIVE ORDER NUMBER 8 (1991)

LIMITED CONTINUATION OF OFFICE
OF CONSUMER SERVICES

Executive Order Number 7 (1991) abolished the Office of Consumer Services within the Governor's Office and consolidated its functions within the Office of Public Counsel. However, the Office of Consumer Services is currently a involved in the following listed cases in which it has taken positions on issues which cannot adequately be handled by other parties to the actions: Illinois Commerce Commission Docket No. 89-0351 in the Illinois Commerce Commission; Petition for Review of the Order of the Illinois Commerce Commission Docket No. 86-0511 and Docket No. 87-0123 in the Illinois Appellate Court for the First District Sixth Division; Consolidated Appeals from Order of the Illinois Commerce Commission in Illinois Commerce Commission Docket No. 89-0276 in the Illinois Appellate Court for the Third District; and Petition for Review of Order of the Illinois Commerce Commission in Illinois Commerce Commission Docket No. 90-0006 in the Illinois Appellate Court for the Third District.

I hereby modify Executive Order Number 7 (1991) and order that the Office of Consumer Services shall continue within the Office of Public Counsel for the limited purpose of completing the cases listed above. Upon completion of these cases, the Office of Consumer Services shall be deemed abolished.

March 19, 1991

Jim Edgar
GOVERNOR

FILED
INDEX DEPARTMENT

MAR 19 1991

IN THE OFFICE OF
SECRETARY OF STATE

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